OVERVIEW

The purpose of the School of Science and Mathematics is to provide programs and coursework to students in the fields of science, engineering, technology, and mathematics. The school also contributes course offerings for HPU's liberal arts and sciences general education curriculum. Undergraduate degrees are offered in the areas of biology, biomedical engineering, biomedical science, chemistry (with concentrations in biochemistry and forensic science), computer information systems, engineering science, information systems management, mathematics and software engineering.

COURSES DESCRIPTIONS

Biology

BIO 1101–4609: Special Studies
Special courses not a part of the regular schedule but offered on an irregular schedule.

BIO 1159: Health Professions Seminar
This seminar course is designed to introduce the health professions to students pursuing a career in related fields such as medicine, dentistry, physical therapy, optometry, etc. Students will learn about various programs in Texas including common prerequisites and experience requirements, hear from current health professionals, and explore the application process. The course is developed for freshmen and transfer students considering a career in the health professions. Online. Spring.

BIO 1409: Biological Science
A study of the development of the principle concepts of biology and how they have influenced civilized man; a study of fundamental structure and function of biological systems. Contemporary problems will be discussed. This course is designed for non-science majors. Three hours lecture and two-hour laboratory. Spring or as needed.

BIO 1410: Human Biology
This course is a survey of the human body and its functions. Topics will include the scientific method and how it relates to understanding cells, tissues, organs and human disease. This course is designed for non-science majors. BIO 1410 can be counted toward the general education laboratory science requirement. Three hours lecture and two hours laboratory. Fall, Summer or as needed.

BIO 1439: Environmental Science
A study of the development of the principle concepts of biology and how they have influenced civilized man; a study of fundamental structure and function of biological systems. Contemporary problems will be discussed. This course is designed for non-science majors. Three hours lecture and two-hour laboratory. Spring or as needed.

BIO 1459: General Biology I
An in-depth study of the principles and concepts of biology which apply to all organisms with a focus on cell biology, genetics, and ecology. This course is designed for science majors. Three hours lecture and one three-hour laboratory. Fall.

BIO 1469: General Biology II
This course is a continuation of the in-depth study of the principles and concepts which apply to all organisms with a focus on plants and animals. Field trips will be required. This course is designed for science majors. Three hours lecture and one three-hour laboratory. Spring.

BIO 2114, 3114, 4114: Biology Teaching Assistant Internship
A course designed to give Biology majors teaching experience in a classroom setting under the supervision of a participating instructor. Forty-five (45) hours of service is required and may include time in, preparation before, and clean up after class. Fall, Spring, Summer.

BIO 2120: Global Studies in Biology
This is an experiential learning course that helps students see the global applications and relevance of their major. Students will connect biological concepts to the real world through diverse cultural perspectives. The course may be repeated for credit as long as the travel location has changed. Spring.

BIO 2369: Plant Biology
A study of the physiology, life cycles and diversity within the Plant Kingdom. Topics will cover all areas of plant biology and range from the molecular basis of fruit and seed production to the plants' role in the ecosystem and society. Three hours lecture. Spring, even years.

BIO 2409: Fundamentals of Microbiology
Fundamental concepts of the biology of microorganisms will be taught. Emphasis will be principally on bacteria, fungi, and viruses causing human disease and

impacting human health through their effects on the environment. Three hours of lecture and three hours of laboratory per week. Fall.

BIO 2449: Zoology
This course examines the diversity and ecological roles of the animal kingdom. Key topics include taxonomy, anatomy, physiology, development, and behavior of invertebrate and vertebrate animals. This course is designed for science majors. Three hours of lecture and one three-hour laboratory. Fall, odd years.

BIO 2489: Human Anatomy and Physiology I
This course emphasizes the structure and function of cells, tissues, organs, and organ systems, including the integumentary, skeletal, muscular, nervous, and endocrine systems. Three lecture hours and two lab hours per week. Fall, Summer.

BIO 2499: Human Anatomy and Physiology II
Continuation of BIO 2489, including the cardiovascular, lymphatic, respiratory, digestive, and reproductive systems. Three lecture hours and two lab hours per week. Spring, Summer.

BIO 3399: Pathophysiology
This course will provide a conceptual understanding of the pathophysiological progression of diseases in the human body. Spring, odd years.

BIO 3419: Microbiology
An introduction to the structure, function and economic relationship of bacteria, fungi, and viruses. Three hours lecture and three hours of laboratory per week. Spring.

BIO 3429: Cell Biology
A detailed study of the structure and function of cells and cell structures. Regulation and mechanisms will be stressed. Three hours of lecture and three hours of laboratory per week. Spring.

BIO 3438: Genetics
A study of the theories, principles and mechanics of inheritance, including the latest molecular knowledge of DNA and RNA. Three hours of lecture and three hours of laboratory per week. Fall.

BIO 3469: General Ecology
A study of the basic principles of ecology (organisms in relation to environment) and relating these principles to many of the Earth's ecological challenges, using modern and classical ecological studies. Three hours lecture and three hours laboratory per week. Spring, odd years.

BIO 4109: Research Proposal
This course guides students through the development of a formal research proposal, emphasizing literature review, hypothesis development, experiment design, and scientific writing. Students will learn how to evaluate primary scientific literature, identify research gaps, formulate research questions, and design feasible experiments. The course culminates in the preparation of a complete written research proposal suitable for use in subsequent research and thesis courses. Spring.

BIO 4119: Research
A course emphasizing independent investigation, experimental design, collecting and analyzing data and drawing logical conclusions based on the data. Students will propose and conduct a novel independent research project. Fall.

BIO 4211: Senior Thesis and Assessment
This is the culmination of the educational experience for biology majors. Students will demonstrate the ability to communicate about biology by writing a scientific paper, preparing a scientific poster, and giving a scientific presentation over an independent research project completed before entry into the course. By attending and participating in presentations, students will develop skills in listening and questioning. Students will also be assessed on their knowledge about biology and general laboratory skills and competencies. Spring.

BIO 4329: Developmental Biology
A study of how cells differentiate, examining how diverse multicellular organisms develop from one cell into a fully functioning being. also focusing on the process of producing advanced structures such as limbs, hands, and fingers. Three hours lecture per week. As needed

BIO 4349: Medical Entomology
This course focuses on the role of arthropods in human and animal health. Major topics include vector-host interactions, mechanisms of disease transmission,

epidemiology of vector-borne diseases, and vector biology and control. This course is designed for science majors. Three hours lecture. Fall, odd years.

Chemistry

CHE 1101-4609: Special Studies
Special courses not a part of the regular schedule, offered on an irregular schedule.

CHE 1105: Chemical Calculations I
Problem-solving techniques for CHE 1479 General Chemistry I. One-hour lecture per week. Fall.

CHE 1106: Chemical Calculations II
Problem-solving techniques for CHE 1489 General Chemistry II. One-hour lecture per week. Spring.

CHE 1130: Chemical Calculations For Non-Majors
Discussion of materials and problem-solving techniques for CHE 1430. Introduction to Organic and Biological chemistry. One-hour lecture per week. Spring.

CHE 1429: Fundamentals Of Chemistry I
A foundational chemistry course designed for preparing students for General Chemistry 1479 as well as Chemistry 1430 and for students in non- science majors who do not need an extensive chemistry background. The course includes the structure, properties and changes in matter, quantitative relationship in reactions, solutions, equilibrium, kinetics, pH, buffers and nuclear chemistry. This course fulfills the general education curriculum requirements for a lab science course. Not recommended for science majors or pre-professional students in health-related fields. Does not meet prerequisites for CHE 1489 or CHE 2331. Three hours of lecture and two hours of laboratory per week. Fall, Summer.

CHE 1430: Introduction To Organic And Biological Chemistry
An analysis of the chemical processes that are important to biological systems. The course will cover organic, biochemical, and food/physiological chemistry as it pertains to the human body including, but not limited to, structural analysis of organic molecules and macromolecules, protein interactions, and biological metabolism. This course fulfills the general education curriculum requirements for a lab science course. Three hours of lecture and two hours of laboratory per week. Spring, Summer.

CHE 1479, 1489: General Chemistry I, II
A study of the fundamentals of chemistry with emphasis on atomic structure, chemical bonding, the periodic system, descriptive inorganic chemistry, equilibria and elementary thermodynamics of chemical systems. Three hours lecture and three hours laboratory per week. Concurrent enrollment in CHE 1105 and CHE 1106 respectively is highly recommended. CHE 1479, Fall, Spring; CHE 1489, Spring, Summer.

CHE 2139, 2149: Organic Chemistry Laboratory I, II
A two-semester study of the laboratory techniques and methods used in modern organic chemistry. Three hours of laboratory per week. CHE 2139, Fall. Summer; CHE 2149, Spring, Summer.

CHE 2331, 2341: Organic Chemistry I, II
A study of organic chemistry emphasizing nomenclature, bonding, structural relationships to reactions; reaction types and mechanisms and synthetic methods. CHE 2331, Fall; CHE 2341, Spring.

CHE 3001: Laboratory Assistant Internship
Students will gain experience in preparing, conducting, and evaluating laboratory studies.

CHE 3101, 3201, or 3301: Chemistry Laboratory Internship
A student undertakes an internship program in a company in which the operation is STEM (Science, Technology, Engineering and Mathematics) related. A site supervisor representing the company and academic advisor are appointed. The student is required to submit an abstract of proposed work/project for approval prior to beginning the internship. The student will orally present a report of the internship to a committee of at least three faculty and one student, including the academic advisor. The site supervisor is to provide a written evaluation of work performance of the intern. Forty-five clock hours of service per credit hour are required. No more than four hours may apply toward a Chemistry degree. (Courses may be repeated for credit, but only four hours of STEM internship will apply to the Chemistry degree.) Fall, Spring, Summer.

CHE 3119, 3129: Physical Chemistry Laboratory I, II
An introduction to the equipment, methods and laboratory skills needed in modern physical chemistry. Three hours of laboratory per week. CHE 3119, Fall, odd years; CHE 3129, Spring, even years.

CHE 3311, 3321: Physical Chemistry I, II
A two-semester study of the physical properties and structure of matter together with chemical interactions from the perspectives of thermodynamics, quantum mechanics, chemical kinetics and symmetry. Three hours lecture per week. CHE 3311, Fall, odd years; CHE 3321, Spring, even years.

CHE 3469: Quantitative Chemistry
The theory and practice relating to the major analytical techniques in chemistry will be studied. These include gravimetric, volumetric, electrochemical and colorimetric methods of analysis. Three hours of lecture and four hours of laboratory per week. Fall, even years.

CHE 4381: Advanced Inorganic Chemistry
A study of the chemistry of the main group elements including bonding, symmetry, periodic properties, and the chemistry of the transition elements. Three hours of lecture per week. As needed.

CHE 4389: Environmental Chemistry
This course explores the fundamental chemistry evident in prevalent environmental issues. Topics will include both anthropogenic and natural phenomena that affect water, air and soil condition. Current domestic and global environmental concerns will be analyzed by comparison of popular media representations with scientific literature and published data. Application of analytical chemistry to the study of these issues will be demonstrated. Two hours of lecture and two hours of laboratory per week. As needed.

CHE 4439, 4449: Biochemistry I, II
Chemical studies of biological processes emphasizing conformation, metabolism, biosynthesis, genetic information and molecular physiology. Three hours lecture and three hours laboratory per week. CHE 4439, Fall, even years; CHE 4449, Spring, odd years.

CHE 4469: Instrumental Analysis
The study of the principles upon which instrumentation is based along with the practical application of spectral interpretation. Three hours of lecture and three hours of laboratory per week.

Computer Information Systems

CIS 1070: The Integration of Faith and Technology
This seminar asks how a distinctly Christian worldview can impact technology usage and implementation. Through case studies and guided discussion, you will probe questions relating to ethics, stewardship of data, and vocational calling in tech fields. This course may be repeated as many times as needed. Students shall complete this course once per year during a regular semester for any calendar year in which the student takes a Rize Education course.

CIS 1101-4609: Special Studies
Special courses in computer information systems not a part of the regular schedule but offered on an irregular schedule.

CIS 1339: Introduction To Information Technology
An introductory course in computer information systems and computer literacy. The course covers topics of hardware, software, computer security, operating systems, basic networking systems and other current trends in technology. It is expected that students will focus in utilizing word processing, spreadsheets, and presentation software. Fall, Spring, Summer.

CIS 1360: Programming Fundamentals
An introduction to programming and developing logic concepts for structured programming. Importance is given to problem solving, Boolean logic, algorithm design, and documentation. Fall.

CIS 1381: Introduction To Cybersecurity
In today's world, no one is safe from cyber-attacks, but everyone can be prepared. This course will teach you how malicious actors use social manipulation and technology to launch devastating attacks - and provide you with the tools you'll need to defend against them. Whether you pursue one of the many available jobs in cybersecurity or just want to secure your own privacy, you'll learn how to make the Internet safer. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The

partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2310: Applications In Excel
A study of advanced features of Microsoft Excel including those assessed in the Core MOUS exam. Students will expand their knowledge and develop spreadsheets that will address typical situations they would encounter in the real world. Fall, Spring odd years.

CIS 2311: Data Visualization
A study of techniques useful in organizing, cleaning, and analyzing business data for the purpose of answering questions and solving problems. Concepts introduced in the course aim to develop an understanding of different types of business data, various analytical approaches, and the application of those approaches to solve business problems. The course teaches techniques for accessing online data, utilizes technologies and applications to analyze data, generate insights, or make predictions, and to use visualization tools to represent data in compelling, interactive, and visual formats. Fall, even years.

CIS 2329: Web Programming I
This course introduces students to the many components of websites. Some of the topics covered will include: HTML, CSS, JavaScript, and server file systems. The student learns to design, construct and maintain webpages and websites. Fall, Odd years.

CIS 2341: Networking
An introduction to networking principles and design. The course covers the different networking layers, creating and administrating a network, and how applications communicate across a network. Spring.

CIS 2349: Web Programming II
Building on the front end of web design in CIS 2329 by learning server-side programming to create dynamic websites. Understand a connection to a database to pull date to populate the website. Spring, even years.

CIS 2369: Analysis Of Algorithms
Design of computer algorithms for numeric and nonnumeric problems; relation of data structures to algorithms; analysis of time and space requirements of algorithms, complexity and correctness of algorithms. Fall.

CIS 2370: Foundations Of Data Analytics I
In an increasingly data-driven world, everyone should be able to understand the numbers that govern our lives. Whether or not you want to work as a data analyst, being "data literate" will help you in your chosen field. In this course, you'll learn the core concepts of inference and data analysis by working with real data. By the end of the term, you'll be able to analyze large datasets and present your results. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2371: Foundations Of Data Analytics II
This course is intended as a continuation of Foundations of Data Analytics I. In this course, you'll learn how Data Analytics are applied within the workforce. Particular attention will be paid to the role of the Data Scientist or Analyst, machine learning and the applications of Big Data. By the end of the term, you will be able to design and execute a range of data-driven experiments. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2375: Career Navigation And Exploration In Data Science
This course will help you find a job in Data Science upon graduation. Not just any job; one that excites you and meets your financial needs. In this course, you will explore career paths in Data Science, potential salary outcomes, and the skills you need to understand whether these salary outcomes will support you. This exploration will lead you to identify target jobs and opportunities. You will then plan the steps you need to take to achieve your goals and begin executing that plan. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses

are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2381: Career Navigation and Exploration in Cybersecurity
This course will help you find a job in Cybersecurity upon graduation. Not just any job; one that excites you and meets your financial needs. In this course, you will explore career paths in Cybersecurity, potential salary outcomes, and the skills you need to understand whether these salary outcomes will support you. This exploration will lead you to identify target jobs and opportunities. You will then plan the steps you need to take to achieve your goals and begin executing that plan. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2382: Network And System Security
Modern organizations know that even the strongest systems can be vulnerable to cyberattacks. As a result, jobs in cybersecurity are rapidly expanding as companies look to secure their digital assets. This course will teach you how to secure those assets by identifying and fixing potential security vulnerabilities. By the end of the course, you will be able to identify and remedy common network and systems vulnerabilities. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2383: Cybercrime And Governance
This course is an introduction to data science in Python. Students will use advanced visualization and predictive modeling tools to turn raw data into actionable insights. Students will also learn how to use SQL to navigate databases. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 2389: Object-Oriented Programming
Covers the four pillars of object-oriented programming (abstraction, encapsulation, inheritance, and polymorphism) in a strict-typed language like Java. Students will build objects and programs to solve problems. UML diagrams, documentation, and version control systems will also be covered. Fall.

CIS 2399: 3D Printing
An introduction to digital modeling, drafting, sketching, and designing for 3D printing. Current modeling software, online services, and printing technologies will be examined. Students will identify, compare, and use multiple 3D modeling software. Spring.

CIS 3309: Object-Oriented Programming Ii
A study of the power and portability of current object-oriented languages from Microsoft and Oracle. Advanced object-oriented design and program development will be encouraged using exercises that range from lengthy programming assignments to major projects. Spring, odd years.

CIS 3319: Project Management
Use of project management techniques and software to manage business activities. Students will use the PMBOK guide as a framework for project management and extend their understanding via hands-on applications. Current project management software will be used to assist in project scope, time, cost, human resources, and communication management. The course may be used as a resource for preparation toward PMP certification. Fall.

CIS 3329: Visual Programming
A course designed to develop visual programming skills. The focus will be on programming in Microsoft's Visual BASIC and Oracle's Power Objects. Projects will explore the human- computer interface of interactive visual programming. Spring, even years.

CIS 3334: Fundamentals Of Layout And Design
A preliminary course for designing with the computer. A study of layout and design techniques including typography, copy fitting, picture editing, color reproduction and the production of camera-ready art. Emphasis will be given to the use of design elements in advertising, magazines and newspapers. Spring.

CIS 3338: Digital Image Manipulation
An introductory course that will cover the fundamentals of digital manipulation. Photo retouching, scanning, image capture, and image creation will be emphasized as well as coverage of layers, filters, masking, and channels. This class will culminate with the rendering of a professional portfolio component. Fall.

CIS 3339: Data Structures
Methods for organizing data; design of algorithms for efficient implementation and manipulation of data structure. Various data sorting and data searching techniques will be examined. Fall.

CIS 3369: Data Base Management Systems
A course concentrating on issues central to the design, implementation, and management of relational database systems. Topics include: Entity Relationship Modeling, SQL, rules, triggers, stored procedures, forms, reports, client/server development environment and integration with WWW. DBMS projects will incorporate current modeling and development software from Oracle and Microsoft. Spring, odd years.

CIS 3370: Data Science I
This course is an introduction to data science in Python. Students will use advanced visualization and predictive modeling tools to turn raw data into actionable insights. Students will also learn how to use SQL to navigate databases. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 3371: Data Science II
This course takes a deep dive into machine learning models, natural language processing, and time series in Python. Students will build machine learning models that solve a range of different business problems, using both structured and unstructured data. Students will learn to create actionable and ethical predictions by balancing accuracy, usability, and interpretability, and bias in model selection, design, training, and inference. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry

leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 3379: Multimedia Technology

This course covers current interactive multimedia technology, aesthetics, and pedagogical issues of communication using interactive multimedia and hypermedia; techniques for authoring interactive multimedia projects using current digital media tools. Students apply principles and procedures of digital art, design, communication, and software authoring while working on integrated media projects. Spring, even years.

CIS 3381: Security Operations

The moments after a breach can make or break an organization. When the unthinkable happens and a cybercrime is discovered, the actions taken by the security operations team can either contain the damage and restore order or lead to catastrophic consequences. This course examines the tools and techniques used to conduct investigations into cybercrimes and teaches the defensive skills necessary to ensure a breach doesn't occur in the first place. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 3382: Ethical Hacking

To stop a hacker, you need to be able to think like a hacker. In this course, you will learn hands-on techniques for attacking and penetrating networks and systems. You'll learn the tools to launch these offensive tactics, and then complete a hands-on project where you will be asked to ethically hack a real system. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 3389: Management Information Systems

An introduction to the integration of information systems solutions and business processes. Topics include how information and information systems related to business processes; how organizations use IS for competitive strategy, and how IS

are developed and managed. Ethical and international dimensions are also covered. Spring, even years.

CIS 4000: Texes Review Ffor Technology Applications Teachers
This course is designed to help students be successful when taking the Technology Applications Texas Examination of Educator Standards (TExES) exam.

CIS 4319: Digital Video Manipulation
This course includes the theory and application for developing videos using computer-based audio and video editing tools. Areas of study include the pre-production, production and post-production process of creating videos. Students will learn to import and manipulate digital audio, video, and graphic elements into computer applications to produce digital videos for use in a variety of media environments. This class will conclude with the creation of a video project that can be used as a professional portfolio component. Fall, odd years.

CIS 4321: Operating Systems
This course is designed to cover the general functions of an operating system, regardless of the hardware environment. Many specific operating systems will be examined: MS DOS, OS/2, Windows NT, UNIX, VAX/VMS, and IBM/MVS. Algorithms for CPU scheduling, memory and general resource allocation; process coordination and management will be covered. Fall. CIS 2348, CIS 2389, CIS 3309 or CIS 3329

CIS 4331: Computer Information Systems Internship
A course allowing individual study outside the academic environment, but under the guidance of the instructor. The purpose is to allow the advanced computer information systems student to obtain "real world" experience in the development and implementation of applications or systems programming projects. Openings at present are limited by the number of employment opportunities and projects that are available. May be repeated for maximum of 6 hours credit. Fall, Spring.

CIS 4339: Digital Illustration
Students will receive specialized training in the creation of computer-generated compositions through the use of a vector-based computer illustration application. Attention will be placed on corporate branding and logo design for the use in both print and screen print. This class will culminate with the rendering of a professional portfolio component. Spring, odd years.

CIS 4340: Artificial Intelligence
A study into the algorithms and structures that are used to build artificial intelligence. A combination of building known algorithms and exploration into novel AI solutions for problems. Spring, odd years.

CIS 4341: Network Design and Administration
An in-depth study of the concepts which govern network designs. The student will apply networking principles through simulations and guided hands- on work. This course is intended to prepare the student for CompTIA or Cisco certification. Fall, even years.

CIS 4348: Computer And Information Security
Principles, theory and practice of computer security and data protection. Topics will include the security aspects and implications of databases, telecommunication systems, and software, along with techniques used to assess risk and discover abuses of systems. Offered on demand.

CIS 4351: Systems Analysis And Design
A course concentrating on techniques and methods currently used in system analysis and design of information systems. Design methodology, project management, system design, program development, testing, documentation, and implementation techniques are covered and students are provided practical application through preparation for and participation in a short-term project involving an information system. Spring.

CIS 4370: Ai And Machine Learning
This course is a technical approach to cutting-edge AI methods. Students will productionize machine learning models to solve business problems, evaluate modern AI use cases (such as computer vision) and adapt Large Language Models (LLMs) for specific applications. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 4371: Data Science Practicum
This course is a capstone project in which students are asked to work through a full data science workflow using real-world data. This course exists to prepare students

for the kind of work they will do on Data Science teams, and as such also features an emphasis on interviewing for jobs in the space and communicating results to stakeholders. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 4381: The Future Of Cybersecurity

Technology is racing forward, and cybersecurity must stay ahead to meet new challenges and threats. In this class, you will learn about the changing landscape of cybersecurity, emerging mobile technologies that are likely to be targeted, and new forms of cyber-attacks being launched. By the end of the course, you will be able to implement the most cutting-edge practices in cybersecurity in order to protect against attacks. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 4382: Cybersecurity Capstone

The Capstone course is the culmination of the Cybersecurity program, allowing students to apply their knowledge to real-world challenges. Students will undertake a comprehensive project integrating various aspects of cybersecurity, including log analysis, vulnerability assessment, incident response, ethical hacking, and cloud security. This project will develop critical thinking skills and prepare students for major cybersecurity certifications. This course is offered via HPU's partnership with Rize, an education company that prepares students for careers in the fastest-growing fields. The partnership allows students to earn HPU credit toward in-demand degree programs. Courses are designed by top academics and industry leaders, vetted by HPU, and taught by expert faculty from other colleges and universities.

CIS 4390: Senior Project

A capstone course that culminates in a group project that incorporates the content from previous classes. The students complete a real-world project by developing a solution that fits a client's needs. This course should be taken the last spring semester before graduation. Spring. All prerequisites must carry a grade of “C” or better, or consent of instructor.

Engineering

ENS 1101: Introduction To Engineering I
An introduction to the engineering profession, including ethics, design and teamwork, communication, estimation, and problem solving. One hour lecture per week. Fall.

ENS 1305: Engineering Computer-Aided Design Systems
Application of contemporary engineering computer-aided design (CAD) systems for measurements and control by means of interfacing sensors and DAQ devices. Students will develop skills to analyze, design, and build both real and virtual instruments for scientific data acquisition, real-time signal processing and engineering design control in a team environment. Two hours lecture and 2 hours lab per week. Fall.

ENS 1379: Engineering Principles And Practices
A course designed to begin development of engineering problem-solving skills in complement with computer tools. Three hours lecture per week. Spring.

ENS 2104, 2204, 2304: STEM Internship
A student undertakes an internship program in a company in which the operation is STEM (Science, Technology, Engineering and Mathematics) related. A site supervisor representing the company and academic advisor are appointed. The student is required to submit an abstract of proposed work/project for approval prior to beginning the internship. The student will orally present a report of the internship to a committee of at least three faculty and one student, including the academic advisor. The site supervisor is to provide a written evaluation of work performance of the intern. Forty-five clock hours of serve per credit hour are required. No more than four hours may apply toward an Engineering Science degree. (Courses may be repeated for credit, but only four hours of STEM internship will apply to the Engineering science degree.) Fall, Spring, May, Summer.

ENS 2301: Statics
Force and moment vectors; equivalent force-couple systems; force equilibrium and free body diagrams; trusses; beams; cables; dry frictional forces; centroids and moments of inertia; distributed loads; hydrostatics. Spring.

ENS 2302: Dynamics
Position, velocity, and acceleration vectors; Newton's laws of motion; linear and curvilinear motion; particle and rigid body kinematics and kinetics; rotating reference frames; linear and angular momentum; work-energy; impulse-momentum; elastic and inelastic impact; vibrations and periods of oscillation. Fall.

ENS 2334: Engineering Economic Analysis
The course focuses on economic cost analysis and feasibility studies of engineering design projects and their implementation. Concepts and principles of engineering economics decision making including consideration of potential problems and issues with the design and implementation will be studied and possible solutions considered. Time value of money and other cash-flow concepts are also covered. Three hours lecture per week. Spring, even years.

ENS 3104: Special Topics In Engineering Applications
This course provides an in-depth understanding of specific topics or current issues within the engineering discipline. Through independent study, students will gather information about a current engineering topic or issue and analyze potential engineering applications relevant to the topic or issue. Hardware and/or computer-based design of a prototype is strongly encouraged. The selected choice requires instructor approval. Both written and oral reports are required. The course can be repeated for credit up to five times. Spring.

ENS 3306: Technical Writing For Engineering
This course is designed to give students an understanding of the basic concepts in the field of technical writing. It is especially designed to interest majors in Engineering. Spring, even years.

ENS 3331: Thermodynamics
Introduction to the fundamental principles of classical engineering thermodynamics. Application of mass and energy balances to closed and open systems including systems undergoing transient processes. Entropy generation and the second law of thermodynamics for closed and open systems. Introduction to phase equilibrium and chemical reaction equilibria. Ideal solution behavior. Three hours lecture per week. Fall.

ENS 3339: Mechanics Of Materials

Stress and strain in materials; axial deformation and Hooke's law; normal and shear stress/strain and the linear constitutive law; multi-axial loading; transformation of stress/strain and Mohr's circle; torsion of circular shafts; shear- and moment-diagrams for beams; beam stresses and deflections; statically indeterminate and composite beams; pressure vessels; columns; combined loading; and Castigliano's theorem. Two hours lecture and 2 hours lab per week. Fall

ENS 3351: Engineering Ethics
This course will examine ethical issues in engineering relating to professional and societal issues. Topics such as professional ethics codes, moral aspects of problem solving, responsibilities to employers, co-workers, clients, and the public will be discussed. Students will consider ethical solutions to scenarios drawn from various case studies as well as possible future ethical challenges in the engineering profession. Three hours lecture per week. Spring, odd years.

ENS 4109: Design Project Lab Proposal
Students, provided with a framework for an engineering design specification, will propose a solution to a specific design problem. Students will be required to hypothesize and search scientific and engineering literature for supporting materials, attend weekly design progress meetings, consider financial and ethical constraints and document findings in an engineering notebook. Using engineering standards, students will be required to provide a formal written design proposal and present this proposal orally. Students may work individually or in teams and the outcome used as a basis for implementation of the design in ENS 4369. 3 hours lab per week. Spring.

ENS 4309. Electrical Circuit Theory
This course presents the fundamental concepts and principles of electrical circuit theory. Students will study Ohm's law, Kirchhoff's laws, techniques of circuit analysis, Op-Amps, RC and RLC circuits and apply these concepts in practical situations. Students will use Laplace and Fourier transforms to analyze circuits. Using PSpice, students are required to solve challenging circuit design problems. (SPICE: simulation program with integrated circuit emphasis). 2 hours lecture + 2 hours lab per week. Fall.

ENS 4344. Advanced Engineering Research and Development
The course offers a continuation of engineering project work in the direction of advanced research and development resulting in patent applications, conference participation, journal paper writing and other dissemination activities. Fall, Spring.

ENS 4369 and 4379: Engineering Design Project Lab I And II

A two-semester senior design project lab that emphasizes student integration of concepts learned throughout the curriculum. The goal is to familiarize students with the rigors of the engineering design process from initial conceptualizations to final implementation. Students work individually or in teams as they design, construct, and test their projects. Documentation in an engineering notebook is required as is a written and oral report showing the design details including market feasibility and ethical protocols for their product, prototype and/or simulation. 2 hours lecture and 3 hours lab per week. ENS 4369, Fall; ENS 4379, as needed. Prerequisites: ENS 4369: ENS 4109 and credit or concurrent in ENS 4309; ENS 2334, and ENS 3351. ENS 4379: ENS 4369, MAT 4441.

Forensic Science

FRS 1479: Introduction To Forensic Science

This course provides an overview of forensic science field training for the science and non-science student alike. Principles of chemistry, such as chromatography and qualitative organic analysis, and other physical sciences are applied to crime scene analysis. Other popular methods, such as fingerprint and blood spatter analysis, are explored. Class time includes three hours lecture and two hours laboratory per week. Fall, Summer.

Mathematics

MAT 1101-4609: Special Studies

Special courses not a part of the regular schedule, offered on an irregular schedule.

MAT 1332: Contemporary Mathematics (Mathematics For Liberal Arts)

Contemporary Mathematics is a survey course for non-STEM majors which includes introductory treatments of number sense, logic, algebraic concepts, geometric concepts, financial mathematics, probability, statistics, and graph theory. Fall, Spring.

MAT 1351: College Algebra

A course designed to meet the general education mathematics requirement for any BA or BS degree offered at HPU. Topics studied include data analysis, modeling, complex numbers, special equations and inequalities, functions, polynomial and

rational functions, exponential and logarithmic functions, matrices, and determinants. Fall, Spring, Summer.

MAT 1431: Foundations Of Algebra
A conceptual approach to the study of basic computations of whole numbers, fractions, and integers. Additional topics studied: algebraic expressions and equations; exponents; polynomial arithmetic; factoring polynomials; systems of equations. This course prepares students for College Algebra. (Developmental course - elective credit only; does not satisfy the mathematics requirement for any degree.) Fall, Spring.

MAT 1371: Mathematics For Elementary Teachers I
Problem solving, sets, number systems, mathematical systems, natural numbers, real and complex numbers are studied. This course requires two hours per week of mathematical laboratory. Required for elementary teacher certification. Fall.

MAT 2342: Introduction To Probability And Statistics
A beginning course studying frequency distributions, probability, binomial and normal distributions, random sampling, testing hypothesis, confidence intervals, and other topics as time permits. Fall, Spring.

MAT 2343: Statistics
Topics include frequency distributions, graphs, measures of location and variation, the binomial and normal distributions, confidence intervals, z-test, one and two sample t-test, F-test, Chi-Square probability, correlation, covariance, regression, ANOVA. A student project is required for this course. Spring.

MAT 2345: Pre-Calculus Mathematics
Topics discussed include trigonometric functions, solutions of right and oblique triangles, logarithms, identities, trigonometric equations, polar coordinates, graphical interpretation of the equations of plane curves, straight lines, conic sections, parametric equations, introduction to analytical geometry, sequences series, mathematical induction, and the binomial theorem will be discussed in this course. Fall, Spring, Summer.

MAT 2347: Discrete Mathematics
This course provides an introduction to topics in logic, set theory, algorithms, recursion, relations, graphs, and trees. It also exposes students to mathematical

proofs and abstract thinking. The course is designed for mathematics or computer information systems majors. Fall.

MAT 2445: Accelerated Pre-Calculus
Topics covered include Functions and Their Graphs, Polynomial and Rational Functions, Exponential and Logarithmic Functions, Trigonometry, Matrices and Determinants, Sequences and Series, and Topics in Analytics Geometry. Fall. Note: If the student's high school Pre-AP Pre-Calculus or AJP Calculus grade is B or higher the student should be in Calculus I MAT 2451.

MAT 2451: Calculus I
Topics covered include limits, differentiation, applications of differentiation, basic integration, and the Fundamental Theorem of Calculus, and applications of integration. Utilizes an online homework, quiz, and practice program including a study plan to improve student learning. Fall, Spring.

MAT 2461: Calculus II
Topics covered include exponential, logarithmic and other transcendental functions, integration techniques, improper intervals, infinite sequences and series, power series, and parametric and polar equations. Utilizes an online homework, quiz, and practice program including a study plan to improve student learning. Spring.

MAT 3302: Matrix And Linear Algebra
An introduction to matrices and vectors, applications of matrices including solutions of systems of linear equations. Also, an introduction to vector spaces, algebraic structures, linear transformations and characteristic values. Fall.

MAT 3311: Abstract Algebra
Introduction to number theory, groups, rings, integral domains, fields, isomorphisms, and the characterization of the integers and real numbers. Spring, even years.

MAT 3321: Mathematics For Elementary Teachers II
Basic concepts of geometry including the metric system and measurement, logic, probability and statistics. This course requires two hours per week of mathematics laboratory. Required for elementary teacher certification. Spring.

MAT 3322: Geometry
Development of Euclidean and non-Euclidean geometry by theoretical and intuitive methods. Recommended for all prospective secondary teachers. Spring, odd years.

MAT 3361: Calculus III
Topics covered include parametric equations, polar coordinates, vectors, surfaces in space, multivariable calculus, multiple integrations, and other topics as time permits. Fall.

MAT 3381: Mathematics For Secondary Teachers
An examination of the major topics of secondary and middle school mathematics curriculum in light of the National Council of Teachers of Mathematics Standards. Techniques to implement the standards through the use of manipulatives, graphing calculators, computer technology, and projects will be explored. This course is required for the secondary and middle school teaching field in mathematics. Spring, odd years.

MAT 3451: Differential Equations
Differential Equations is a course covering solutions and applications to the more common types of ordinary differential equations, especially those of first and second order, with emphasis on geometrical and physical interpretation. Other topics include LaPlace Transforms, Initial Value Problems, Eigen Values, Eigen Vectors, and Solutions of Systems of Differential Equations. Spring.

MAT 4101: Mathematics Capstone
This course serves as a review of undergraduate level mathematics, preparing students for the MFT in Mathematics. Students will propose, research and present an independent project. Fall.

MAT 4181. TExES REVIEW
This course is required of those who will be clinical teaching. This course is designed to help students pass the Texas Examination of Educator Standards (TExES) for education students in their respective major Fall.

MAT 4200: Foundations Review And Assessment
Topics included are overviews of the three foundational topics (Calculus; Algebra and Geometry; Differential Equations and Analysis) for graduates in mathematics. Required assessments include unit exams for each of the foundational units, an essay articulating the importance of a chosen foundational course, and a standardized assessment of all foundational topics. Spring.

MAT 4351: Real Analysis

An axiomatic approach to the real numbers, sequences, functions, continuity, derivatives, integrals, series, and uniform convergence. Spring, even years.

MAT 4361: Complex Analysis
A study of complex numbers, analytic functions, exponential, trigonometric, and logarithmic functions of a complex variable, complex integration, Laurent Series, and residue theory. Fall, even years.

MAT 4441: Applied Probability And Statistics For Engineering And Mathematics
Descriptive statistics, discrete and continuous probability distributions, Central Limit Theorem, inferential statistics, regression, and correlation analysis, with emphasis on engineering applications. Spring.

MAT 4371: Introduction To Numerical Analysis
Error propagation, algorithms for solutions of equations in one variable, interpolation, numerical integration, and algorithms for solutions of differential equations (as time permits). Two hours of lecture and two hours of laboratory per week. Fall, odd years.

Physics
PHY 1101-4609: Special Studies
Special courses not a part of the regular schedule, offered on an irregular schedule. Prerequisite: none.

PHY 1419: General Physics I
The first semester of a two-semester, algebra-based sequence in classical physics, covering topics in mechanics including motion, force, energy, momentum, fluid flow and waves. Three hours of lecture and one two-hour laboratory period per week. Fall, odd years. Prerequisite: MAT 2345 or MAT 2445 or consent of instructor.

PHY 1429: General Physics Ii
Continuation of PHY 1419, covering topics in thermal physics, electricity and magnetism. Three hours of lecture and one two-hour laboratory period per week. Spring, even years. Prerequisite: PHY 1419.

PHY 2105: University Physics Calculations I
A problem-oriented course designed to assist students in mastering calculations for university physics.

PHY 2106: University Physics Calculations Ii
A problem-oriented course designed to assist students in mastering calculations for university physics.

PHY 2439: University Physics I
The first semester of a two-semester, calculus-based sequence in classical physics for mathematics, physical science, pre-engineering or engineering students. Topics include vector mechanics and kinematics. Three hours of lecture and one two-hour laboratory period per week. Fall. Co-requisite: MAT 2451.

PHY 2449: University Physics II
Continuation of PHY 2439, covering topics in thermodynamics, electricity and magnetism. Three hours of lecture
and one two-hour laboratory period per week. Spring.
Prerequisite: PHY 2439 and MAT 2451.

Science

SCI 1200: Medical Terminology
This course is a basic study of medical terminology. The content focuses on building knowledge of medical language used in the health professions with an emphasis on spelling, definition, pronunciation, and usage. The course cannot count towards the degree requirements for a major or minor in biology or minor in biomedical sciences. Online. Fall, May. Prerequisite: none.

SCI 2104-2304: Medical Internship
Supervised work outside of the academic environment, but under the guidance of an instructor. Forty-five (45) clock hours of service per credit hour is required. The purpose is to provide students with medical experience in a health profession setting. May be repeated for credit. Fall, Spring. Prerequisite: consent of instructor.

SCI 4109: Chemistry Research Proposal
A course emphasizing library research, independent investigation, hypothesis formation and scientific proposal writing. Prerequisite: consent of instructor.

SCI 4209: Research Problems In Chemistry
A course emphasizing independent investigation using the scientific method to collect and analyze data in order to test the validity of a hypothesis. The conclusions

determined will be presented and discussed in both a written and oral format. Fall, Spring. Prerequisite: SCI 4109.

SCI 4210: Research Problems In Chemistry II
A continuation of SCI 4209 Research Problems in Chemistry. This course allows students to extend independent investigation using the scientific method to collect and analyze data in order to test the validity of a hypothesis. The conclusions determined will be presented and discussed in both a written and oral format. Fall, Spring. All prerequisites must carry a grade of "C" or better, or consent of instructor. Prerequisite: SCI 4209.